SHUTTERING WITH SUPPORTING RING HAVING EXTENDABLE DRAWERS

[0001] The invention relates to a device for producing a hollow-cylindrical concrete lining on shaft walls of vertical shafts, having at least one shuttering element which is radially spaced from the shaft wall and forms a concrete shuttering, a supporting ring at the lower end of the shuttering element, and a sealing assembly in the region of the supporting ring to seal the concrete shuttering relative to the shaft wall.

[0002] It is known from the prior art to provide, in the region of the supporting ring, a sealing assembly in the form of manually tailor-made shuttering boards which are arranged on the supporting ring and close off the concrete shuttering relative to the shaft wall. What is disadvantageous about this solution is that the manually tailor-made shuttering boards have to be separately tailor-made and adapted by hand to form each set of concrete shuttering. This makes production of the concrete lining on the shaft walls of a vertical shaft time-consuming and expensive.

[0003] A device for producing a hollow-cylindrical concrete lining on shaft walls of vertical shafts is known from U.S. Pat. No. 4,270,876 A. Here, a shuttering element which serves for producing a concrete lining of vertical shafts is described. At the lower end of this shuttering element there is arranged a supporting ring. On the supporting ring there are extendable elements for supporting the supporting ring on the shaft wall. The sealing between the supporting ring and shaft wall takes place here by way of an inflatable element. What is disadvantageous about the solution described here is that the seal gap between the supporting ring and shaft wall which can be bridged with the inflatable element is only limited, which requires a high degree of accuracy when drilling the vertical shaft and a low amount of breakouts. Furthermore, the inflatable element is susceptible to damage, so the production of the concrete lining in the vertical shaft frequently has to be interrupted.

[0004] The object of the invention is therefore to devise an improved device which makes possible effective, rapid and reliable production of a hollow-cylindrical concrete lining on shaft walls of vertical shafts. In particular, the time taken to produce and seal concrete shuttering should be shortened, and interruptions by maintenance work during the production of the concrete lining should be reduced.

[0005] This object is achieved by a device having the features of claim **1**.

[0006] Owing to the fact that the sealing assembly is formed by a plurality of drawers which can be extended radially against the shaft wall, the sealing assembly can guarantee rapid and reliable sealing of the concrete shuttering relative to the shaft wall in the region of the supporting ring. The drawers of the sealing assembly which can be extended radially against the shaft wall can easily bridge the seal gap between the supporting ring and shaft wall by the drawers being extended against the shaft wall relative to the supporting ring. With the extendable drawers, a sealing assembly which is rapidly adaptable to the shaft wall is produced which seals the concrete shuttering relative to the shaft wall at the lower end of the shuttering element. The drawers which can be extended radially against the shaft wall upon being extended against the shaft wall lead to sealing of the concrete shuttering, so that the shuttering can be used to produce the hollow-cylindrical concrete lining on the shaft wall of the shaft by filling the gap, formed by the concrete shuttering, between the shuttering element, shaft wall and sealing assembly. Once the concrete poured into the concrete shuttering from above has set in the concrete shuttering, the shuttering can be displaced in the shaft in order to line the shaft wall at a next location.

[0007] Advantageous configurations and developments of the invention will become apparent from the dependent claims. It should be pointed out that the features listed individually in the claims may also be combined with one another in any technologically sensible manner whatsoever and thus reveal further configurations of the invention.

[0008] According to one advantageous configuration of the invention, provision is made for the drawers, driven by way of drives, to be able to be extended and retracted relative to the supporting ring. With drawers driven by way of preferably hydraulic drives (electric or pneumatic drives are also possible), said drawers can be extended or retracted automatically relative to the supporting ring. As a result, manual activities when sealing the concrete shuttering to produce the concrete lining on the shaft walls can be reduced further.

[0009] One particularly advantageous embodiment of the invention provides that each drawer is assigned a separate drive. With separately-driven drawers, they can be moved against the shaft wall independently of each other. Owing to the drawers which can be moved independently of each other, unevenness on the shaft walls of the shaft can be compensated for easily in that the drawers, independently of each other, are moved against the shaft wall by different amounts radially relative to the supporting ring. As a result, particularly easy and rapid sealing of the concrete shuttering in the lower region of the shuttering element is possible.

[0010] One advantageous embodiment provides that the drawers each form partial arc segments of an arcuate sealing assembly. Owing to the fact that the drawers each form partial arc segments which seal the arcuate seal gap between the shuttering element and shaft wall, a sealing assembly which can easily be adapted to the shaft wall can be made available, which sealing assembly makes reliable sealing of the concrete shuttering possible. With the partial arc segments, breakouts when drilling or blasting the vertical shaft and hence also deviations in the diameter of the shaft can be compensated.

[0011] One particularly advantageous embodiment of the invention provides that drawers arranged next to one another form common regions of overlap. With these regions of overlap, reliable sealing of the concrete shuttering in the lower region can be achieved. With the overlapping of the drawers which can be extended radially against the shaft wall, these form a tight closure of the concrete shuttering between the shuttering element and the shaft wall. Even in the completely-extended state of the drawers which can be extended radially against the shaft wall, these, by the regions of overlap, form a closed-off lower face of the concrete shuttering, so that concrete poured into the concrete shuttering can set there to line the shaft walls.

[0012] According to one preferred configuration of the invention, provision is made that the regions of overlap are each formed along the periphery of an arcuate sealing assembly between two adjacently-arranged drawers. With the formation of the regions of overlap in each case along the periphery of the circular sealing assembly, the regions between two adjacently-arranged drawers can be bridged effectively. As a result, the arcuate sealing assembly forms